



**Departamento de Economía**  
Facultad de Ciencias Sociales  
Universidad de la República

## **Documentos de Trabajo**

### **Decomposing the Gaps between Afro-descendants and Whites along the Wage Distribution**

**Marisa Bucheli y Graciela Sanroman**

**Documento No. 14/10**  
Octubre 2010

ISSN 1688-5031

# **Decomposing the Gaps between Afro-descendants and Whites Along the Wage Distribution<sup>1</sup>**

**Marisa Bucheli<sup>2</sup>   Graciela Sanroman<sup>3</sup>**

**Primera versión: Setiembre 2010**

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<sup>1</sup> Authors acknowledge support from the ANII (Agencia Nacional de Investigación e Innovación) FCE2007\_143.

<sup>2</sup> Department of Economics, Faculty of Social Sciences, Udelar. email: marisa@decon.edu.uy

<sup>3</sup> Department of Economics, Faculty of Social Sciences, Udelar. email: gsanroman@decon.edu.uy

## **Abstract**

In this paper we analyze the racial wage gap in Uruguay in the period 2006-2009 using data from the Household Survey collected by INE (the National Statistics Institute). We select a sample of full-time men workers aged 25-59. We decompose the gap between log hourly-wages of Whites and Afro-descendants at the mean and at each percentile of the wage distribution using the distributional regression approach proposed in Chernozhukov et al. (2009). We find that Afro-descendants are paid less in all position of the wage distribution and that the gap increases from the median up. It is around 0.20 until the median and reaches 0.60 at percentile 90. The results from the decomposition show that both the gap that can be explained by selected characteristics (years of schooling, potential experience and region) and the residual widen at the upper tail of the distribution.

Keywords: Wage gap, Afro-descendants, Discrimination, Counterfactual estimation

## **Resumen**

En este trabajo se analiza la brecha salarial racial en Uruguay en el período 2006-2009 utilizando datos de la Encuesta Continua de Hogares relevada por el INE. Se selecciona una muestra de trabajadores de tiempo completo con edades entre 25 y 59 años. Se descompone la brecha entre los salarios por hora (en logaritmos) de blancos y afro-descendientes en la media y en cada percentil de la distribución salarial, utilizando la estimación de regresiones distribucionales propuesta en Chernozhukov et al. (2009). Los resultados indican que los afro-descendientes reciben salarios inferiores en todos los percentiles de la distribución salarial y que la diferencia se incrementa a partir de la mediana. La brecha es de 0.2 hasta la mediana y alcanza 0.6 en el percentil 90. Se encuentra que tanto la brecha que puede ser explicada por diferencias en las características de los individuos (años de educación, experiencia potencial, región) como el residuo, se amplían en el tramo superior de la distribución.

Palabras clave: brecha salarial, afro-descendientes, discriminación, estimación contrafactual

JEL Classification: C14, C21, D31, J31, J71

## 1. Introduction

A large body of empirical literature reports the existence of racial earnings gaps and tries to disentangle whether they stem from differences in productivity, labor discrimination and/or other factors (Fugazza, 2003 and Atal et al., 2009 among others). Most of these studies analyze the average earnings gap following the Blinder-Oaxaca proposal. Thus, they try to capture the portion of the average gap that is explained by differences in observed characteristics. The remaining residual has been traditionally interpreted as a measure of labor discrimination. This strategy has been generalized to study and decompose the differences along the distribution of earnings (Albrecht et al, 2003; Chernozhukov et al., 2009; DiNardo et al., 1996; Machado and Mata, 2005; Ñopo, 2008).

Most of the international evidence indicates that an important portion of the average racial wage gap is explained by disparities in two variables that capture differences in productivity: education and experience. However, it is also found that a sizeable portion of the gap cannot be explained by observed differences of these variables, and there is controversy about whether this unexplained component could be attributed to disparities in returns to skills and thus interpreted as evidence of labor discrimination (Fugazza, 2003).

The first analysis of the racial wage gap in Uruguay is found in Bucheli and Porzecanski (2010). They decompose the average wage gap between Afro-descendant and White workers in Uruguay. In this paper we enrich this analysis by studying the differences at each percentile of the conditional (on race) distribution of wages. We decompose the gap into two components: the first one captures differences that can be explained by disparities in some observed selected characteristics, and the second is the residual. The first component is obtained by performing a counterfactual exercise. To this end we use a semi-parametric approach given by the estimation of distributional regressions explained in Chernozhukov et al. (2009).

We estimate the conditional distribution within the White subpopulation, controlling for education, potential experience and region, and then we obtain a counterfactual distribution of wages for Afro-descendants. This allows us to recover counterfactual means and percentiles of wages and calculate the portion of the total gap (on average and at each

percentile) that could be explained by disparities in observed characteristics. Our main findings are that characteristics can explain between 45 and 60 percent of the gap along the distribution. Besides, both the total gap and the component that can be explained by characteristics increase from the median of the distribution upwards.

This paper is organized as follows. In Section 2 we summarize the literature. In Section 3 we describe the data and some selected descriptive statistics. In Section 4 we explain the econometric methodology. In Section 5 we analyze results and in Section 6 we conclude.

## **2. Previous research**

The seminal papers of Blinder (1973) and Oaxaca (1973) addressed the issue of decomposing the average wage gaps among subpopulations: the total average gap between two groups (split by gender or race) is decomposed into one component that can be explained by differences among labor market characteristics (covariates  $x$ ) and another associated with returns. The latter component has been traditionally interpreted as a measure of discrimination, but it actually corresponds to a residual, that is the portion that cannot be explained by the observed characteristics included in the model.

There is a controversy on the theoretical explanation of the sources behind the racial dimension of inequality in the labor market. Fugazza (2003) indicates that there are four groups of theoretical approaches: models of discrimination based on tastes, on statistical discrimination, on persistent intergenerational discrimination and on urban economic theory.

The empirical literature shows a wide range of results for the magnitude of the average racial gap and its decomposition. In the USA the average gap was around 30 percent in the nineties and 12-15 percent of that gap could not be explained by differences in characteristics (Fugazza, 2003). In the UK the gap between whites and racial minorities is around 10 percent, but it cannot be entirely explained by disparities in labor characteristics of groups (Blackaby et al., 2000).

Arcand and D'Hombres (2004) study the racial wage gap in Brazil, finding that the hourly wages of Blacks and Browns are on average half those of Whites. They show that labor characteristics (educational attainment, labor market experience and health) of Blacks and Browns are largely lower than those of Whites, and that this explains more than half of the racial average difference in wages.

Atal et al. (2009) study the ethnic wage gaps in seven countries of Latin America (Bolivia, Brazil, Chile, Ecuador, Guatemala, Paraguay and Peru) using the non-parametric approach proposed by Ñopo (2008). Pooling the data from those countries, they find that the observed average ethnic gap is around 38 percent and the between-group difference in education explains a significant portion of it. However, they find a substantial heterogeneity in these figures across countries. In the explanation, the authors emphasize that the relevant ethnic groups are different among countries and so the discrimination differs in size and nature. For example, the fact that the primary language of Indigenous in Bolivia is not Spanish may be important in the explanation of labor market differences of Indigenous and Whites in Bolivia. But Afro and White populations in Brazil share the same language.

In Uruguay only a few studies have addressed these issues, mainly because it is only since 2006 that the Household Survey (hereafter HS) has been collected information about race. Bucheli and Porzecanski (2010) analyze the average wage gap between Afro-descendant and White workers in Uruguay using the 2006 HS and find results which are consistent with the evidence for Brazil. They estimate mean and quantile regressions of the semi-log wage function including a dummy for race, which are found to be negative and significant in all estimations. They also decompose the average wage gap into three components: endowments, returns and selectivity. They find that the average gap is around 35 percent for full-time men workers and that the characteristics can explain half of this gap.

The standard Oaxaca-Blinder decomposition has been improved and extended in various directions in recent years. First, other moments (like quantiles) have been taken into account. Second, the decomposition of differences between two distributions has been applied to the cases of changes in wage distribution over time, or to study the effect of a certain policy. Finally, non-parametric and semi-parametric methods have been applied in

order to perform counterfactual exercises to disentangle the portion of the gaps which can stem from differences in characteristics along the wage distribution (DiNardo et al., 1996; Albrecht et al., 2003; Chernozhukov et al., 2009; Machado and Mata, 2005; Nopo, 2008).

Over the last decade, many studies have focused on the wage gap along the wage distribution using the quantile regression approach. That approach improves previous studies in two ways. First, it yields more accurate results than decomposing the average gap using mean regression because it deals with the existence of conditional heteroskedasticity in log wages. Second, it allows decomposition of the gap along the wage distribution.

Most of the studies analyze the gender wage gap and find that it widens at the top of the distribution (Albrecht et al., 2003; Arulampalam et al., 2007). This phenomenon has been interpreted as the presence of a *glass ceiling* in the labor market. A glass ceiling means an earnings difference that comes from disparities in the chances of gaining access to higher job positions. That is, we should observe increasing discrimination as one moves up the working hierarchy (for a discussion of the meaning of glass ceiling, see Cotter et al., 2001). As pointed by Pendakur and Woodcock (2010), most of the empirical studies use data that do not allow us to distinguish whether the pattern found stems from difficulties in gaining access to well-paid positions inside the firm or problems in accessing jobs at high-wage firms. They call this latter phenomenon a *glass door*: it affects not the positions in the hierarchy but the distribution of firms where minority workers are employed.

However, the studies of racial differences do not find systematic patterns. Levanon and Raviv (2007) find that in Israel, the wage gap between Jews and the Druze increases at the upper end of the distribution but for Muslims and for Christians, the wage gap is U-shaped. Pendakur and Pendakur (2007) also find quite different patterns for different minorities in Canada and, furthermore, patterns vary among educational levels.

In the above-mentioned study for Latin America, Atal et al. (2009) analyze the racial gap along the wage distribution and find that it is U-shaped for the pool of the seven countries when controlling for gender, age and education. However, when they add demographic and

job-related characteristics as controls, they find that the unexplained gap becomes roughly homogenous along the wage distribution.

There is still controversy about whether the unexplained gap can be interpreted as a difference due to discrimination. In particular, in the field of racial gaps some studies reveal that minorities have unequal access to educational quality. If the distribution of omitted or unobservable variables is systematically different among races and correlated to education, the estimated returns to education will be biased. Similar concern arises from the fact that the variable that captures education is subject to measurement errors. Therefore, the estimation of returns to education could be affected by potential biases.

There is also a potential problem stemming from the fact that labor experience is approximated by potential experience. If Afro-descendant workers are more likely to be unemployed or out of the labor force than Whites, potential experience overstates actual experience and the estimation of differences in the pay structure is not accurate. Evidence reported for the USA by Antecol and Bedard (2003) shows that the role of the labor force attachment gap should not be neglected: according to their estimates for a pool of men, the attachment gap explains one and a half times more of the racial earnings gap than do the educational differences.

Finally, the estimate could be also biased because of unobserved heterogeneity caused by family background, social networks or inherited human capital.

### **3. Data description**

We use the HS collected by the National Statistics Institute in Uruguay. The HS has been collected annually since 1980. It provides information about socio-demographic variables, labor characteristics and income. It was only in 2006 that it began to inquire about racial descent through a question that allows self-reporting of multiple kinds of descent. According to these data, about 86% of the population reported only white descent, 10% were Afro-descendants and 4% had multiple descent but not African descent.



In this paper we work with the HS collected in the years 2006 to 2009. We use the sample of full-time salaried men aged 25-59 that are Afro-descendants or have only White descent, not including those employed in the rural sector. As shown in Table 1, the sample represents more than a half of the age-group. Note that the employment status of individuals out of the sample is different among races. Afro-descendant men are over-represented in non-employment, in the rural sector and in informal self-employment.<sup>4</sup> On the other hand, White men are more likely to be entrepreneurs or formally self-employed.

The participation of full-time salaried men in the age-group increased from 53% in 2006 to 57% in 2009 whereas unemployment, part-time work and informal activities declined. The changes were not identical for the racial groups. Thus, for White men participation in full-time salaried work increased from 53% in 2006 to 56% in 2009; for Afro men, these figures are 52% and 59%, respectively. These changes are consistent with the expansion of economic activity and the improvement of labor market performance over the period.

The HS inquires the hours worked the week before the interview but the wage received the previous month. Thus, the hourly wage is affected by measurement error. We had to eliminate around 3% of the cases because in spite of being full-time salaried workers, they reported null-wage. We calculate the real hourly wage using the Consumer Price Index.

In Table 2 we report the mean and median values of selected characteristics of the groups. The average wage increases every year of the period for both groups but the average difference between Whites and Afro-descendants is stable at around 0.30 (in log terms).

The average wage differences are consistent with the disparities in observed characteristics. Indeed, the average Afro-descendant worker is younger and less educated than the average White worker. Table 2 shows that, on average, the difference is around 1 year of age and more than 1 year of schooling. We also calculate the hourly wage by age within each group and find that the profile is flatter for the Afro-descendants than for the Whites (Figure 8). In addition, we split each subpopulation sample into ten groups given by the deciles of wages and calculate the average years of schooling within each group. We

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<sup>4</sup> In Uruguay, contributions to the social security system are compulsory for the whole labor force. We define informal workers as the workers who do not contribute to the social security system.

find that the difference between education of Whites and Afro-descendants substantially increases along the wage distribution, from around 1 year of schooling at the lowest decile to 4 at the highest (Table 3). Notice also that the shape of the relationship between wage deciles and years of schooling is flatter in the case of the Afro-descendants.

#### 4. Methodology

In order to study the wage difference at each percentile of the conditional (on race) distribution of wages, we decompose the gap into two components: the first captures differences in selected characteristics and the second is the residual traditionally interpreted as a measure of discrimination. The first component is obtained by performing a counterfactual exercise using the semi-parametric approach given by the estimation of distributional regressions explained in Chernozhukov et al. (2009).

Chernozhukov et al. (2009) argue that this method overcomes the problem of the classical regression approach which, despite its wide use in the literature, is not appropriate in this application due to substantial conditional heteroskedasticity in log wages. They also indicate that the method improves the accuracy of the results with respect to the linear quantile regression approach by relaxing the assumption that conditional quantiles are linear functions of covariates.

Our first step is to obtain the percentiles of the hourly wage distributions of the White and Afro-descendant subpopulations. Unconditional percentiles for a given subpopulation  $j$  (with  $j=0$  for Whites and  $j=1$  for Afro-descendant) are defined by:

$$Q_{Yj}(u) = \inf\{y : F_{Yj}(y) > u\} \quad j \in \{0,1\}$$

where  $y$  denotes the log hourly wage and  $u$  is the percentile (we consider  $u = 0.02, 0.03, \dots, 0.98$ ).

We then calculate the wage gap between White and Afro-descendants at each percentile as:

$$D_Y(u) = Q_{Y0}(u) - Q_{Y1}(u) \quad u = 0.02, 0.03, \dots, 0.98$$

Finally, we decompose the gaps at each percentile into a portion that can be explained by differences of characteristics between groups and the residual.

In order to proceed with the decomposition we perform the counterfactual exercise of calculating the hourly wage distribution that would be observed for the Afro-descendants subpopulation if their returns were equal to those of the Whites.

To obtain the counterfactual distribution we first estimate the conditional distributions  $F_Y(y/x)$  (where  $x$  refers to endowments) for the Whites.

Afterwards we integrate the estimated conditional distributional functions  $F_{Y0}(y/x)$  over the empirical distribution of  $x$  within the Afro-descendants. The marginal distribution of  $x$  is obtained through the observed (weighted) relative frequency of each cell of the plausible values of the  $x$  vector within the Afro-descendants subpopulation.

The conditional distribution associated with the quantile function  $Q_{Yj}(u | x)$  for the White subpopulation is given by:

$$F_{Y0}(y | x) = \int_0^1 1 \{Q_{Y0}(u | x) \leq y\} du$$

whereas the counterfactual marginal distribution for Afro-descendants is defined by:

$$F_{Y0}^1(y) = \Pr\{Y_0^1 \leq y\} = \int_x F_{Y0}(y | x) dF_{x1}(x)$$

The corresponding counterfactual marginal quantile functions are<sup>5</sup>:

$$Q_{Y0}^1(u) = \inf\{y : F_{Y0}^1(y) > u\}$$

Thus, each  $u$ -quantile gap is decomposed into:

$$E_{Y0}^1(u) = Q_{Y0}(u) - Q_{Y0}^1(u)$$

$$D_{Y0}^1(u) = Q_{Y0}^1(u) - Q_{Y1}(u)$$

Notice that  $Q_{Y0}(u) - Q_{Y0}^1(u)$  is the difference at quantile  $u$  that corresponds to the change of the marginal distribution of covariates from  $F_{x0}$  to  $F_{x1}$  fixing the conditional distribution of outcome to  $F_{Y0}(y | x)$ . That figure can be interpreted as the portion of the

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<sup>5</sup> In order to recover counterfactual percentiles we use piecewise linear interpolation.

gap that can be explained by differences in endowments. This implies that in order to estimate the portion of the gap that is explained by differences in characteristics, we assume that returns to characteristics are given by those of White workers. That is, we assume that in case of non-discrimination, the structure of payments of White workers would prevail.

We also perform a decomposition of the average wage gap as follows. The observed average wage gap is given by the difference between the weighted sample average wage of each group, and the counterfactual average is obtained by  $Avg_{Y_0}^1 = \int y dF_{Y_0}^1(y)$ .

Note that instead of directly modeling the conditional moments (means or quantiles) like in Machado and Mata (2005), we model the conditional distribution  $F_Y(y|x)$  separately for each threshold  $y$  and afterwards obtain any counterfactual moment by inverting the estimated counterfactual distribution function (Chernozhukov et al., 2009).

We have to estimate a model for the conditional distribution at each threshold  $y$  (remember that each threshold is given by the percentiles of wages within the White population),

$$F_{Y_0}(y|x) = \Pr(Y_0 < y|x) = \Lambda[m(y,x)]$$

In order to fully specify the model we define  $\Lambda$  as a logit link function and use a linear specification of  $m(y,x) = x'\beta^0(y)$ , where  $\beta^0(y)$  is an unknown function in  $y$  (Han and Hausman, 1990; Foresi and Peracchi, 1995).

The model is then estimated by Maximum Likelihood. The contribution of each individual  $i$  to the log likelihood, at each threshold  $y$  is

$$l_i(y) = d_i(y) \ln \Lambda[m(y, x_i)] + (1 - d_i(y)) \ln (1 - \Lambda[m(y, x_i)])$$

where

$$d_i(y) = \begin{cases} 1 & Y_i < y \\ 0 & \text{otherwise} \end{cases}$$

The log-likelihood is given by  $L(y) = \sum_{i=1}^{N_0} l_i(y)$ , we use only the observations corresponding to individuals who belong to the group of reference, in this case Whites.

The 95 percent confidence intervals for the estimated parameters are obtained using the bootstrap method (100 replications). Chernozhukov et al. (2009) demonstrate that the bootstrap method consistently estimates the distribution of the estimators performed in this work.

## 5. Results

In order to analyze the racial wage gap in Uruguay we consider three different specifications for the index function  $m(y, x) = x' \beta^0(y)$ . In the first specification the  $x$ -vector includes *years of schooling*, *potential experience* (given by age minus years of schooling minus six), *potential experience squared* and a dummy variable *Montevideo* which takes the value 1 if the person is residing in Montevideo. The second specification adds *years of schooling squared*. The third specification considers five *education dummies*, *potential experience* and its square, interactions of the *education dummies* and *potential experience* and the dummy *Montevideo*. We find that all three specifications yield almost identical results in terms of the gap decomposition while the corresponding confidence intervals change only slightly. Thus, we only report and analyze the results from the first specification.<sup>6</sup>

Figure 1 illustrates the cumulative distribution function of the observed log hourly wage of each racial group. The wage distribution function of Afros lies above the function of Whites at all percentiles, reflecting that Afro workers are more likely to be paid less than Whites. Indeed, these positions imply that the density function of Afros lies to the left of the White wage density function. Additionally, Figure 1 includes the counterfactual distribution that assumes that the payments structure is the White one but the characteristics are the Afro-descendant one. This counterfactual distribution lies below the wage distribution of Afros but above that of Whites. This picture indicates that Afro workers would reach higher wage levels if they had the same structure of payments as

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<sup>6</sup> The results from the other specifications are available upon request.

Whites. However, their characteristics do not allow them to catch up with the wage levels of Whites. This overall picture depicts the situation of the four-years period.

Also the average wage gap is stable at around 0.30 (approximately 35 percent of the Afro-descendants wage). This figure is similar to the inter-racial gap obtained by Atal et al. (2009) using data circa 2005 for Brazil (35.5 percent).

In Table 4 we show the results of the average wage decomposition for the four years. We perform both the Oaxaca decomposition and the distributional regression approach. Notice that we do not find relevant differences between the two methods. The results indicate that in 2006 more than half (54 percent) of the average racial wage gap can be explained by differences in endowments. In addition, we find that this proportion has fallen over the period of analysis, and by 2009 it is around 47 percent.

We can interpret a positive residual gap as an evidence of discrimination only if we assume that the distribution of unobservable variables is random, but we know that this is not the case. Therefore, it is important to notice that our estimation of the gap explained by characteristics is not free from potential bias. There are at least three potential sources of errors. First, the estimation of the payment structure: there is evidence that in Uruguay, if not controlled for endogeneity, estimates of returns to schooling are biased downwards (Cid and Ferrés, 2010; Sanroman, 2006). Second, Bucheli and Cabella (2007) show that Afro-descendants suffer more unemployment than Whites which implies that differences between Whites' and Afro-descendants' potential experience underestimate differences in actual experience. Finally, some studies reveal that as well as having fewer years of schooling than the white population, minorities also have unequal access to educational quality. All these features suggest that our estimation of the portion of the wage gap that can be explained by endowments could be biased downwards. Thus, even if we do not obtain an accurate measure of discrimination, the unexplained portion is large enough to conclude that the Uruguayan labor market is not free from discrimination against Afro-descendants.

On the other hand, the portion and the absolute value of the average gap that can be explained by observable characteristics decline between 2006 and 2009. As the average

wage gap is stable, the residual -the measure of discrimination- increases. Two types of explanations can be proposed: discrimination has increased and/or the distribution of unobserved characteristics has changed in a different way between groups.

We believe that the second explanation has a role to play, because between 2006 and 2009 we observe a relative increase of Afro workers in Montevideo and a substantial reduction of the average “Montevideo premium” within the Afro-descendant sub-population. The 95<sup>th</sup> confidence interval for this premium from the OLS estimation (controlling for education and potential experience) is 0.08-0.21 in 2006 and -0.04-0.10 in 2009, which implies that in 2009 it is not significantly different from zero. It is also observed that the premium declined within the White subpopulation but in a moderate way: the confidence intervals are 0.15-0.20 and 0.09-0.14 in 2006 and 2009 respectively. These patterns are consistent with the expansion of economic activity and the improvement of labor market performance in the period. We may expect that the unobservable characteristics of people who enter the labor market during periods of rapid employment expansions are worse than those of people with longer tenure.

In Table 4 we also observe that the proportion of the gap explained by characteristics using the distributional regression approach is around 2 or 3 percentage points lower than when the results are based on the classical regression approach, except for 2008 when both are identical. We also observe that the estimated standard errors in the distributional regression approach are substantially higher, denoting that the classical approach underestimates them.

In addition we study and decompose the racial gap at each percentile. Figure 3 shows that the observed wage difference is not constant along the wage distribution. In 2006 the total gap is somewhat U shaped: it decreases at the lower tail as we move up to the 10th percentile, then it remains stable at around 0.2 (in logs) up to the median. From the median onward, the gap increases monotonically and reaches the value of 0.6 at the upper tail of the distribution. However, below the 10th percentile its confidence interval is large and, in addition, the lower limit of the confidence interval is flat in this region, putting into question whether the decreasing behavior of the total gap below the percentile 10 is

capturing an actual decline or it is merely due to sampling error. The confidence interval also widens at the top of the distribution.

The shape of the gap along the distribution is similar for every year in the period with some variations. In particular, we observe that the curve above the median becomes flatter in 2008 and 2009

In Figure 4 we plot the total gap together with the explained gap and the residual. We observe that the decomposition indicates that approximately half of the gap can be explained by characteristics. In order to analyze these results we proceed with the estimations of both the average estimates and the corresponding confidence intervals.

In Figure 5 we plot the gap that is explained by characteristics and its confidence interval. In 2006 it is stable at around 0.10 up to percentile 40 and then increases monotonically to reach 0.30 at percentile 92. The confidence interval of the explained gap widens substantially from percentile 80 onward. Similar patterns are found in the other years, but we observe that, as for the total gap, the curve is flatter in 2008 and 2009 from the median upwards.

In Figure 6 we show the residual gap and its confidence interval. The residual gap is decreasing below the percentile 20 but the magnitude of its confidence interval is wide enough to prevent us to conclude that discrimination against Afro-descendants is more severe at the bottom of the wage distribution. On the other hand, the residual gap in the central region of the wage distribution is flat and then increases. The point through which it increases varies among years: it starts to rise at percentile 60 in 2006 and 2009, at percentile 75 in 2007 and at percentile 80 in 2008. Its confidence interval widens also at the top of the distribution, but only from percentile 90 onward. These figures can be compared with results of Atal et al. (2009) who find that the residual gap (after controlling for gender, education and age) is U-shaped for the pool of seven Latin American countries. They show that the unexplained gap is around 60 percent at the bottom of the distribution and then reduces substantially until percentile 25 where it is around 20 percent, then it is stable until percentile 75, from this percentile up it increases and reaches 40 percent at the top of the wage distribution.



Finally, in Figure 7 we observe that the percentage of the total gap that can be explained by differences in characteristics follows a clear increasing pattern along the distribution of wages. It ranges between 40 and 60 percent depending on the percentile and the year that we consider; in 2009 this percentage is lower than in previous years.

Summarizing, our results do not allow us to conclude that in Uruguay labor discrimination against Afro-descendants is more severe at the bottom of the wage distribution. But we find evidence indicating that the discrimination measure is higher at the top of the wage distribution. The rise of the residual gap at the top of the distribution suggests that Afro-descendant workers face barriers to obtaining highly paid jobs, which has been interpreted as evidence of the presence of the glass-ceiling phenomenon. However, the increasing pattern of the residual component comes with a substantial increase of the characteristics component, raising the question of the importance of the endowments difference between races.

## **6. Conclusions**

In this paper we analyze the racial gap in Uruguay in the period 2006-2009 using data from the HS collected by INE. We select a sample of full-time men wage earners aged 25-59. We decompose the gap between the log hourly-wage of Whites and Afro-descendants at the mean and at each percentile of the wage distribution using the distributional regression approach proposed in Chernozhukov et al. (2009).

We find that Afro-descendants are less paid in all the positions of the wage distribution and that the gap increases from the median onward. The results from the decomposition indicate that both the gap that can be explained by characteristics (years of schooling, potential experience and region) and the residual widen at the upper tail of the distribution. The former starts to increase below the median while the latter rises above it. Our estimations indicate that the percentage of the gap that can be explained by endowments is increasing along the wage distribution and is between 40 and 60 percent.

The fact that the total wage gap, and particularly the part that can be explained by endowments, is always positive and it widens in the upper tail of the wage distribution, can

be rationalized by the fact that Afro-descendants are less educated than Whites. Moreover, disparities in term of years of schooling are substantially larger at the top than at the bottom of the wage distribution. In addition, the evidence also shows that the profitability of one additional year of schooling is lower for Afro-descendants than for Whites, in particular at high levels of education. We cannot conclude that differences in returns can be explained by the existence of labor discrimination or are driven by unequal access to educational quality. However, these features are indicating that in order to design policies for reducing the racial dimension of inequality, policy makers will have to deal with two aspects: to promote the reduction of drop-outs and to improve the profitability of education for Afro-descendants.

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**Table 1. Employment status of men aged from 25 to 58 years old**

	2006			2007			2008			2009						
Employment Status	Total	White	Afro		Total	White	Afro		Total	White	Afro		Total	White	Afro	
Full-time non-rural salaried workers	53	53	52		55	55	51	***	56	56	58		57	56	59	**
Out of the sample:																
Non-employed	10	9	11	***	8	8	10	***	7	7	8		7	7	9	***
Public program and unpaid family worker	0	0	0		0	0	0		0	0	0		0	0	0	
Part-time non-rural salaried workers	2	2	2	*	2	1	2		1	1	2		1	1	2	
Rural salaried	7	6	10	***	6	6	10	***	7	6	9	***	7	7	8	
Informal self-employed	16	15	21	***	16	15	22	***	17	14	19	***	14	14	18	***
Formal self-employed	6	7	2	***	7	7	2	***	8	7	2	***	7	7	2	***
Entrepreneurs and cooperative workers	6	7	2	***	6	7	3	***	7	7	2	***	6	7	2	***

Test for differences between means \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Source: Household Survey, National Statistics Institute, 2006 to 2009

**Table 2. Statistics of selected variables**

	2006			2007			2008			2009		
	White	Afro		White	Afro		White	Afro		White	Afro	
Number of cases	19.869	2.056		12.916	1.312		11.815	1.318		12.617	1.223	
<i>Mean values</i>												
Wage (log)	5,8	5,5	***	6,1	5,7	***	6,3	6,0	***	6,5	6,2	***
Years of education	9,9	8,3	***	9,9	8,0	***	9,6	8,2	***	9,9	8,3	***
Age	40,2	39,2	***	40,0	39,4	**	40,4	39,5	***	40,4	39,6	***
Montevideo												
(X100)	45	43	**	45	46		45	49	**	47	56	**
<i>Median values</i>												
Wage (log)	5,8	5,6		6,0	5,8		6,3	6,0		6,5	6,2	
Years of education	9,0	8,0		9,0	8,0		9,0	8,0		9,0	8,0	
Age	40,0	38,0		39,0	39,0		40,0	39,0		40,0	39,0	

Test for differences between means \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Data are weighted by sampling weights

**Table 3: Average Years of Schooling by deciles of the hourly-wage distribution**

Decile of hourly-wages	Whites	Afro-descendants	Difference
1	7.9	7.3	0.7
2	8.5	7.3	1.2
3	8.6	7.6	1.0
4	9.0	7.8	1.2
5	9.1	8.0	1.1
6	9.6	8.2	1.4
7	10.0	8.2	1.8
8	10.4	9.1	1.3
9	11.8	9.0	2.8
10	14.2	10.4	3.9

Note: Deciles are obtained separately for Whites and Afro-descendants

**Table 4. Decomposition of the Average log Hourly Wage Gap**

Year	Total Gap	Gap explained by Characteristics		% Explained by Characteristics	
		Classical regression	Distributional regression	Classical regression	Distributional regression
2006	0.299 (0.017)	0.170 (0.009)	0.163 (0.039)	57%	54%
2007	0.328 (0.019)	0.181 (0.009)	0.173 (0.015)	55%	53%
2008	0.288 (0.021)	0.149 (0.010)	0.147 (0.025)	51%	51%
2009	0.290 (0.019)	0.144 (0.011)	0.135 (0.031)	49%	47%

Bootstrap standard errors in parenthesis (100 replicates)

Figure 1: Cumulated Distribution Functions of log Hourly-Wages

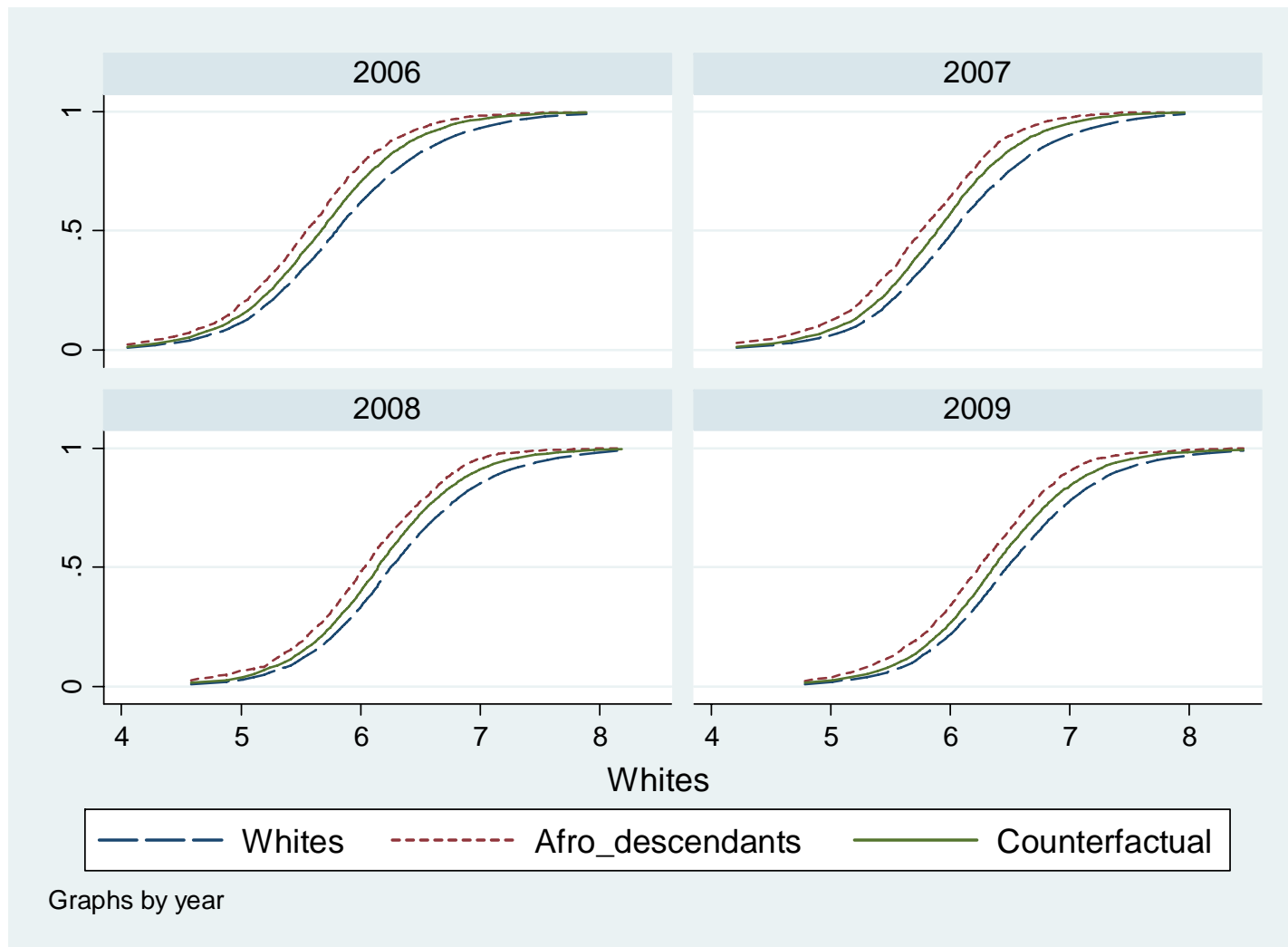


Figure 2: Log Hourly-Wage by percentiles

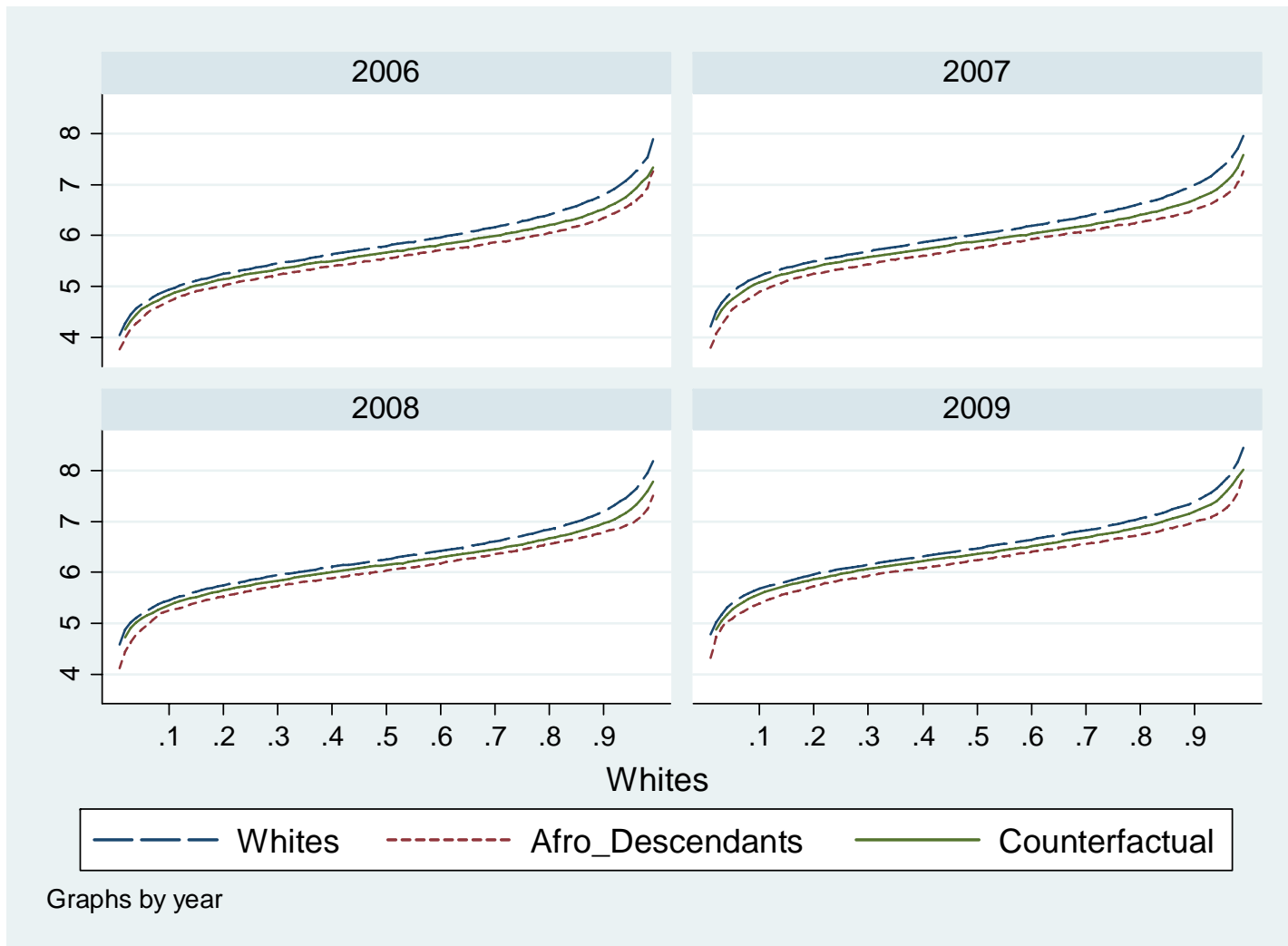
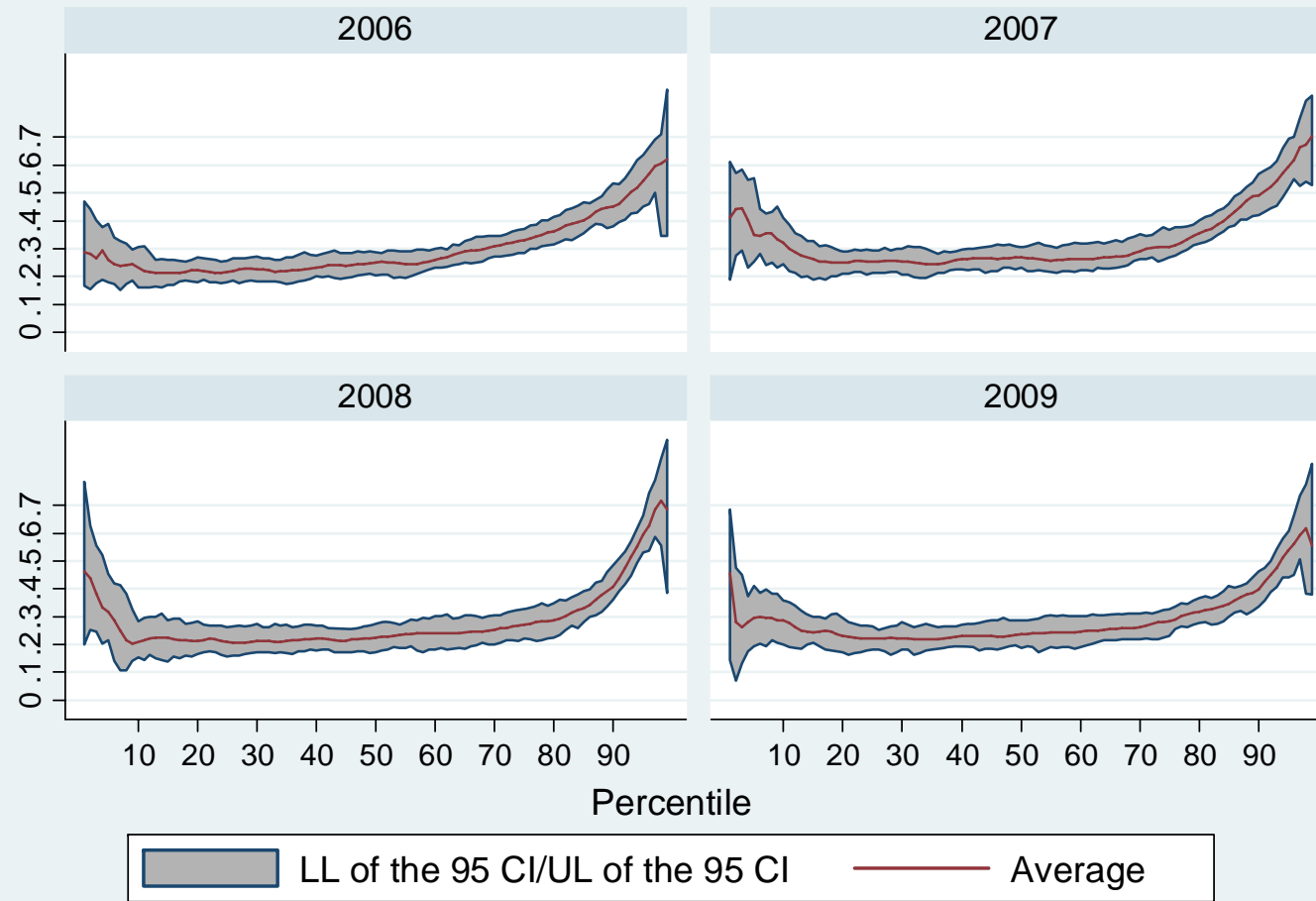


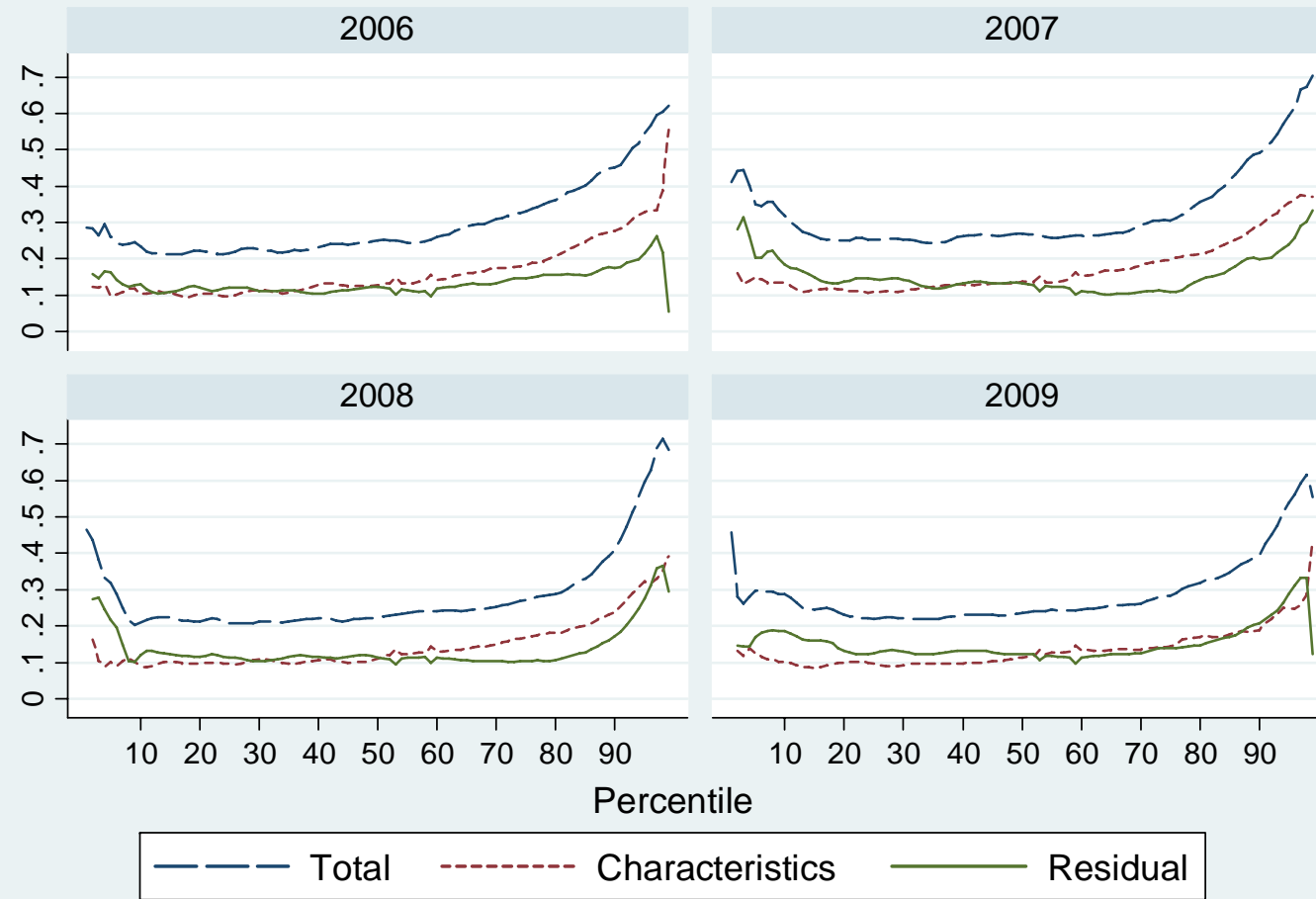


Figure 3: Log Hourly-Wage Gap at each Percentile



Graphs by year

Figure 4: Decomposition of Log Hourly-Wage Gap at each Percentile



Graphs by year

Figure 5: Estimates of the gap explained by characteristics and its confidence interval

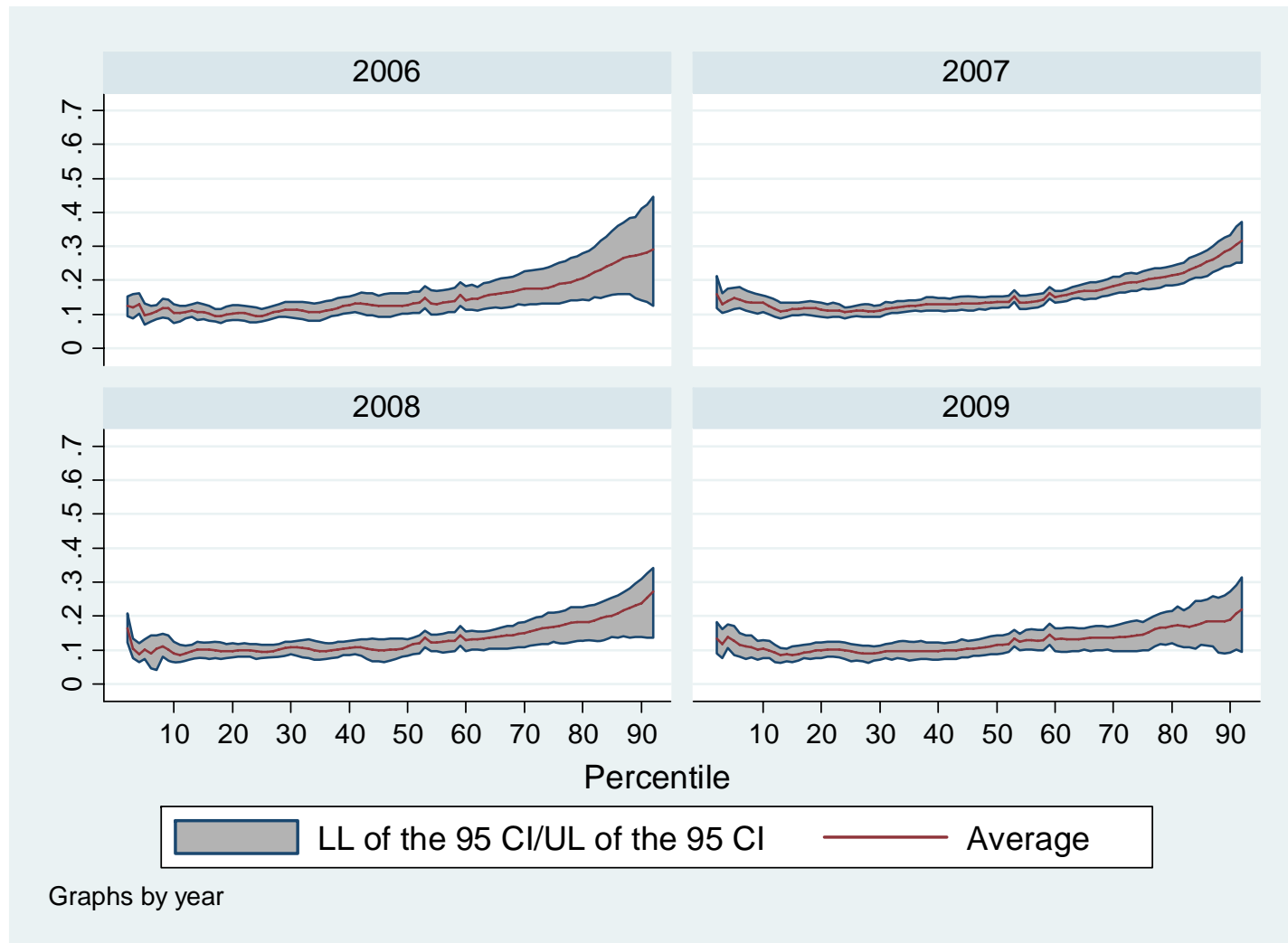
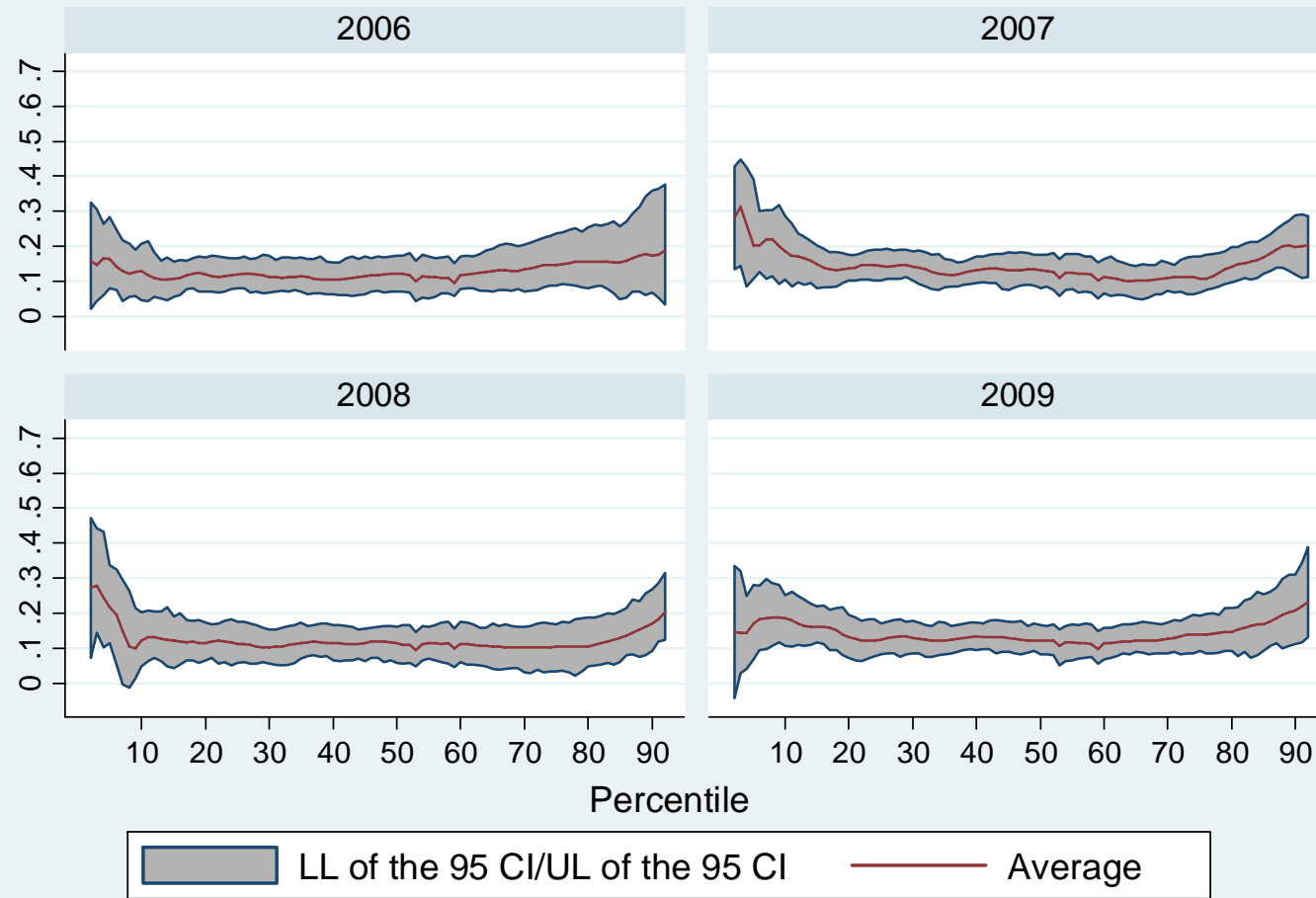


Figure 6: Residual gap and its confidence interval



Graphs by year

Figure 7: Proportion of the gap explained by characteristics

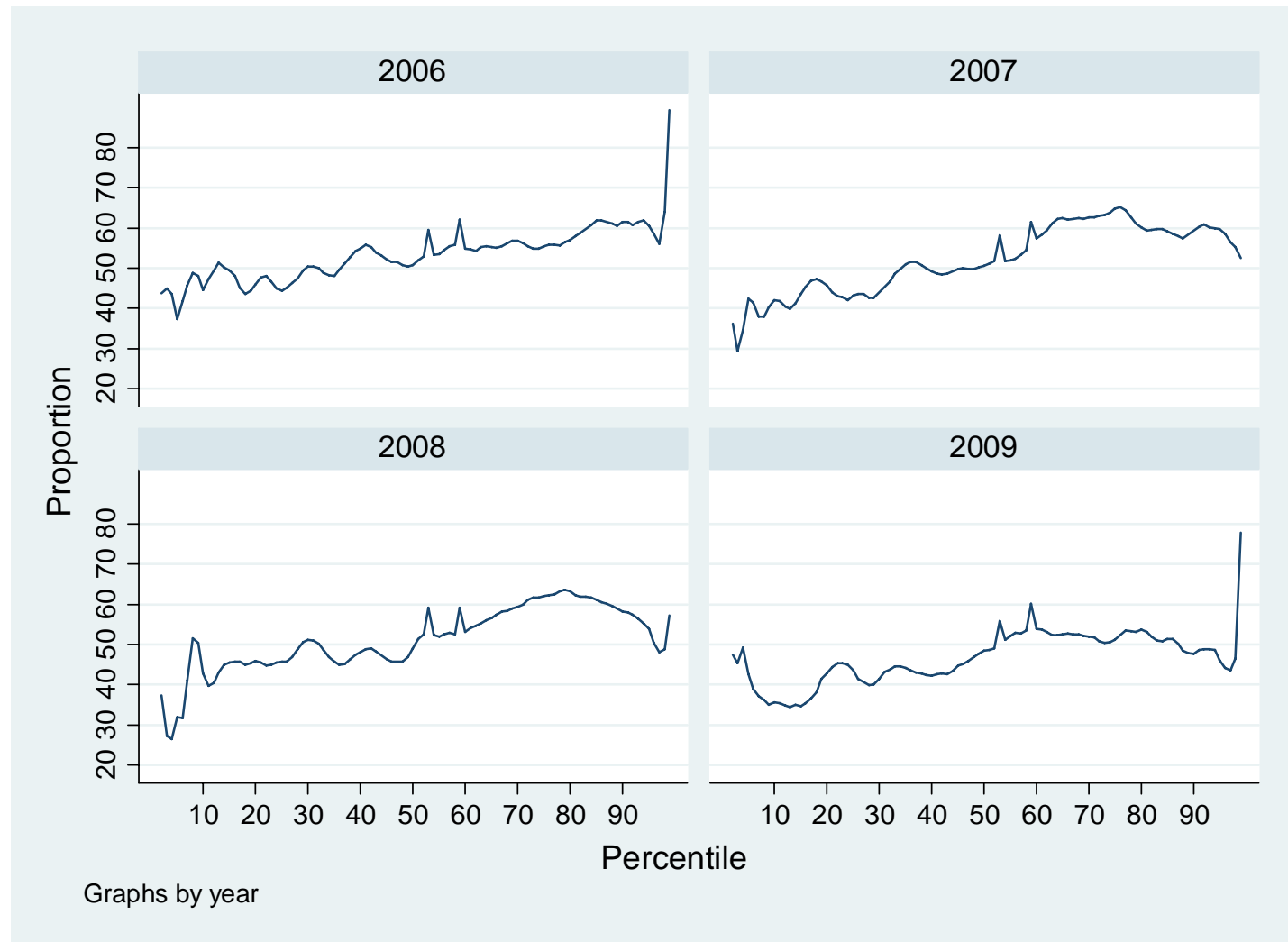


Figure 8: Life cycle pattern of log hourly wages, by race

